REMARKS

This amendment is responsive to the non-final Office Action issued May 24, 2010. Reconsideration and allowance of **claims 2-4, 6-10, and 14-19** are requested.

The Office Action

Claims 2-4, 7-9, and 14-19 were rejected under 35 U.S.C. 103(a) as being unpatentable over Slager (U.S. Patent No. 5,771,895) in view of Close et al. (U.S. Patent No. 6,532,380).

Claim 6 was rejected under 35 U.S.C. 103(a) as being unpatentable over Slager in view of Close et al. in further view of Mo (U.S. Patent No. 6,413,217).

Claim 10 was rejected under 35 U.S.C. 103(a) as being unpatentable over Slager in view of Close et al. in further view of Webler (U.S. Patent Application Publication 2007/0055142).

Claim 16 was rejected under 35 U.S.C. 101.

The References of Record

Slager relates to intravascular ultrasound (IVUS) technology. In IVUS imaging, an ultrasound (US) transducer is mounted on a catheter that is disposed in a sheath. The catheter, hence the US transducer, is rotated and moved (continuously or in steps) to generate a stack of cross sectional ultrasound images. One problem with IVUS is the trajectory which the US transducer followed is not defined. To address this problems, Slager puts a radiopaque markers 68 at intervals along, e.g. around, the sheath. Slager generates biplane fluoroscopic images, e.g. a 2D projection image in a horizontal direction and a 2D projection image in the vertical direction. From this pair of orthogonal images, Slager determines the spatial locations of the radiopaque markers, hence the centerline of the sheath, hence the trajectory followed by the US transducer. Slager starts the US imaging at the first (or last) opaque marker and moves through the sheath at a know speed to coordinate the US images with physical locations along the centerline. Slager then fits or wraps the US cross sectional images around this centerline

Close et al. is directed to a method for image guidance of coronary stent deployment using radiopaque markers and the image processing technique of moving layer decomposition. The radiopaque markers are attached to guidewires or delivery

balloons that are used to place the stent and co-moves with the coronary vessel. A series of fluoroscopic images are taken during the stent placement and by layer decomposition are used to generate layer images which represent different structures in the angiograms, such as the stent and guidewires, background structures, etc.

Mo is directed to an ultrasound image display comprising an ultrasound scanner to create a reference image derived from scanning a subject under study with ultrasound waves and to simultaneously display an enlarged image corresponding to a selected region of interest of the reference image. First display signals corresponding to the reference image are generated in response to the received signals by a first logic unit. Second display signals corresponding to the enlarged image are generated in response to the received signals independent of the generating of the first display signals by a second logic unit. The reference image is displayed in response to the first display signals, preferably on a display, and the enlarged image is displayed in response to said second display signals, preferably on the display.

Webler cannot be relied upon as prior art because the effective priority date of Webler (i.e. filing date March 14, 2003) is later than the effective filing date of the present application (i.e. filing date November 13, 2002).

35 U.S.C. 101

Claim 16 has been amended to address the Examiner's 35 U.S.C. 101 rejection.

Claim Objections

Claims 2, 10, and 14 have been amended to address the Examiner's claim objections.

The Claims Distinguish Patentably Over the References of Record

Claims 2-4, 7-9, and 14-19 are patentable over Slager in view of Close et al. It is respectfully requested that this rejection be withdrawn for at least the following reasons.

More specifically, regarding **claim 19**, Slager does not teach or fairly suggest registering the guide-wire tip in one image with respect to the previously acquired reference noisy image based on the field of motion vectors. Nor does Slager

disclose a display which displays each most recently acquired noisy image combined with the plurality of previously acquired noisy images in real time, much less provide a sequence of medical images depicting movement of the guide-wire through a blood vessel, much less with the vessel walls enhanced. Slager discloses correcting US cross sectional images during pull-back of an intravascular ultrasound catheter through a sheath. Biplane fluoroscopy is used to determine a centerline of the sheath, hence the path followed by the IVUS transducer during pull-back. The IVUS is fitted to or wrapped around the centerline to provide a stack of US cross sectional images. Slager does not disclose displaying a geometrical reconstruction of a catheter centerline or the path of the catheter tip during pull-back, rather Slager uses the determined catheter path to shape the stack of US cross sectional images of the vessel. The present application displays the location of the tip of the guide wire through the blood vessel in each of the combined images thus providing the doctor performing the endovascular intervention a trajectory which defines the path of the guide wire. By contrast, Slager images a vessel from its interior using US. The present application detects and calculates field of motion vectors defining motion of the guide wire tip. Slager determines the location of the US transducer along a centerline by moving at a known speed.

The Office Action asserts that Close et al. in Col. 5 lines 37 – Col. 7 line 16 and Col. 8 lines 33-41 discloses a method for image guidance of coronary stent deployment using radiopaque markers and moving layer decomposition. An image of a lumen of a coronary vessel is generating through moving layer decomposition. The stent includes a plurality of radiopaque markers which allow the position of the stent to be tracked and the visibility of the stent to be enhanced through moving layer decomposition. After each subsequent layer image is calculated the doctor performing the stent deployment can visually inspect the display to determine if the stent is in the proper position. It is respectfully submitted that Close does not teach or fairly suggest displaying the movement of a guide wire in real time by displaying the most recent acquired image along with the plurality of previously acquired images that also display the movement of the guide wire.

There is no apparent reason why one would try to add moving layer decomposition to Slager, no teaching how one would do so, or any suggestion of what one might expect to achieve.

Accordingly it is submitted that independent **claim 19** and **claims 2-4, 6-10, and 14** that depend therefrom distinguish patentable over the references of record.

Claim 15 calls for identifying a skeleton of the guide-wire tip comprising a series of pixels along a centerline of the tip; determining a field of motion vectors based on said skeleton; registering automatically the guide-wire tip with respect to a prior reference image of the sequence based on the field of motion vectors; and displaying the processed sequence. It is respectfully submitted that neither Slager, nor Close et al., nor the combination teach or fairly suggest displaying the guide-tip wire with respect to a prior reference image of the sequence based on the field of motion vectors.

Accordingly it is submitted that independent **claim 15** and **claim 18** that depends therefrom distinguish patentable over the references of record.

Claim 16 calls for determining a field of motion vectors based on said skeleton; registering automatically the guide-wire tip with respect to a prior reference image of the sequence based on the field of motion vectors; and displaying the processed sequence. It is respectfully submitted that neither Slager, nor Close et al., nor the combination teach or fairly suggest the guide-tip wire field based on motion vectors being displayed with respect to a prior reference image of the sequence.

Accordingly it is submitted that independent **claim 16** distinguishes patentable over the references of record.

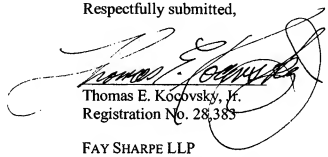
Claim 17 calls for detecting the guide-wire tip, yielding a skeleton of the guide-wire tip comprising a series of pixels along a centerline of the guide-wire tip, and field of motion vectors based on the skeleton; registering the guide-wire tip with respect to a reference based on the field of motion vectors; and displaying a live sequence of processed images. It is respectfully submitted that neither Slager, nor Close et al., nor the combination teach or fairly suggest displaying the guide-tip wire with respect to a prior reference image of the sequence based on the field of motion vectors.

Accordingly it is submitted that independent **claim 17** distinguishes patentable over the references of record.

CONCLUSION

For the reasons set forth above, it is submitted that **claims 2-4, 6-10, and 14-19** distinguish patentably and unobviously over the references of record and meet all statutory requirements. An early allowance of all claims is requested.

Respectfully submitted,



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